

FIG. 1

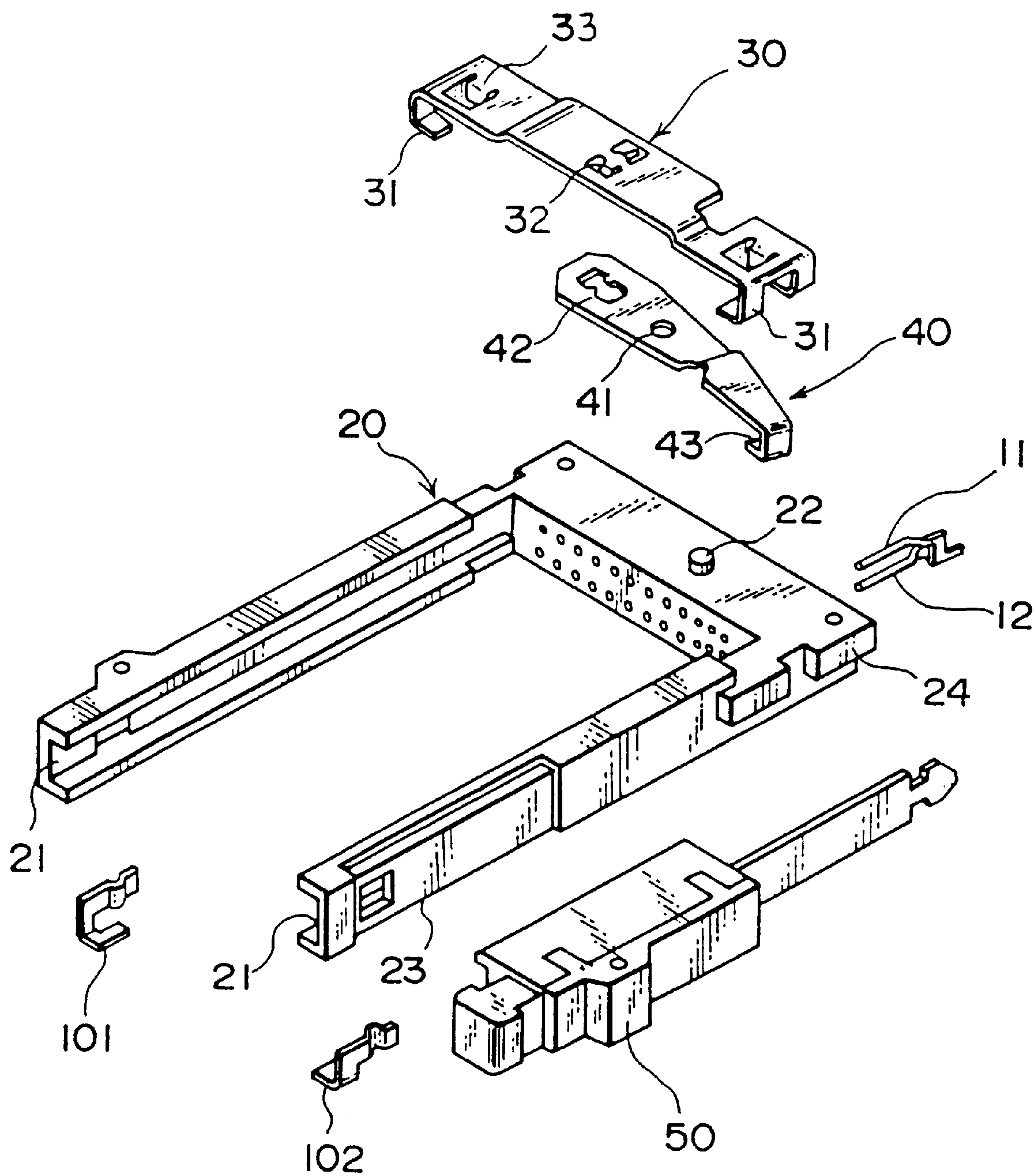


FIG. 2

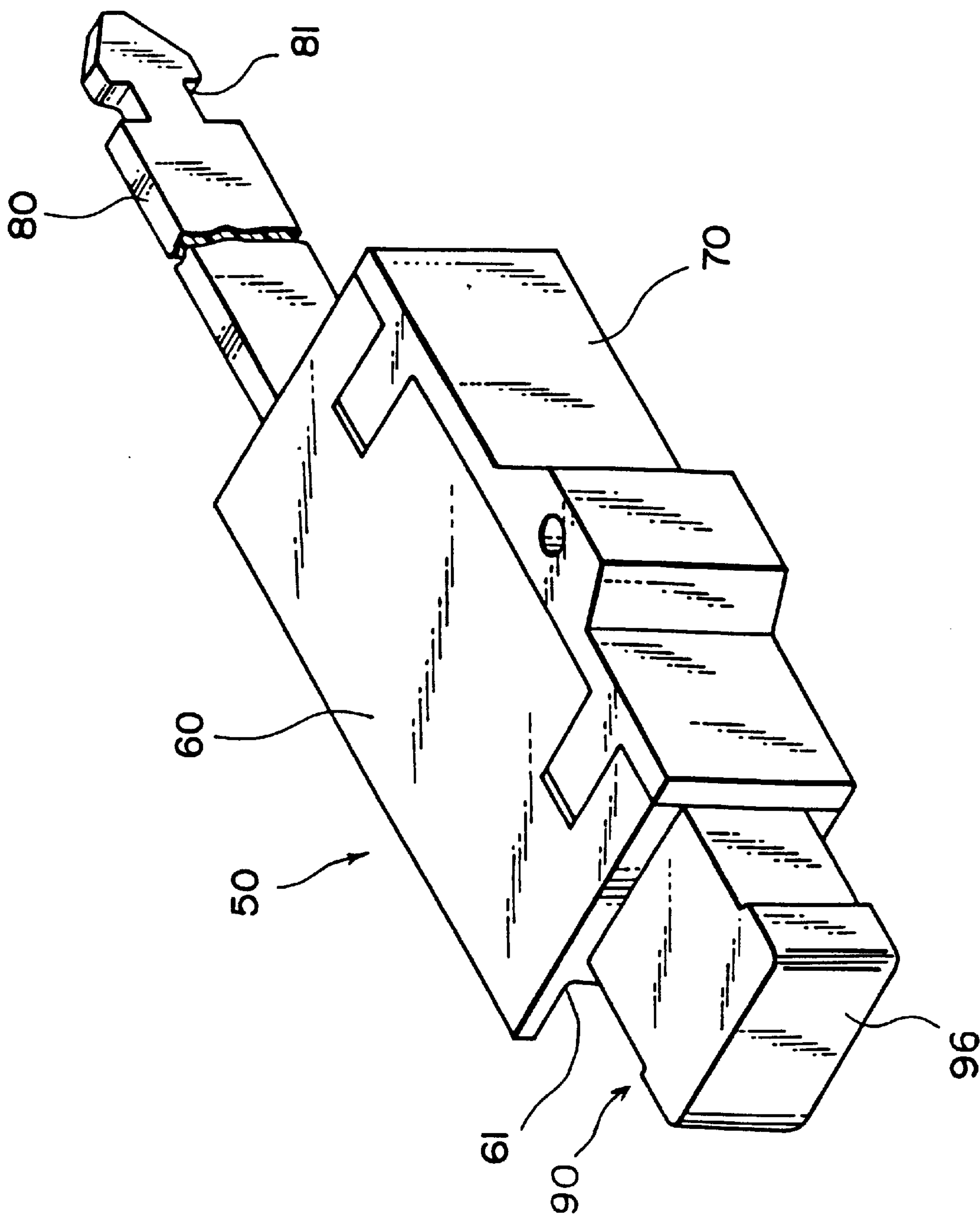


FIG. 3

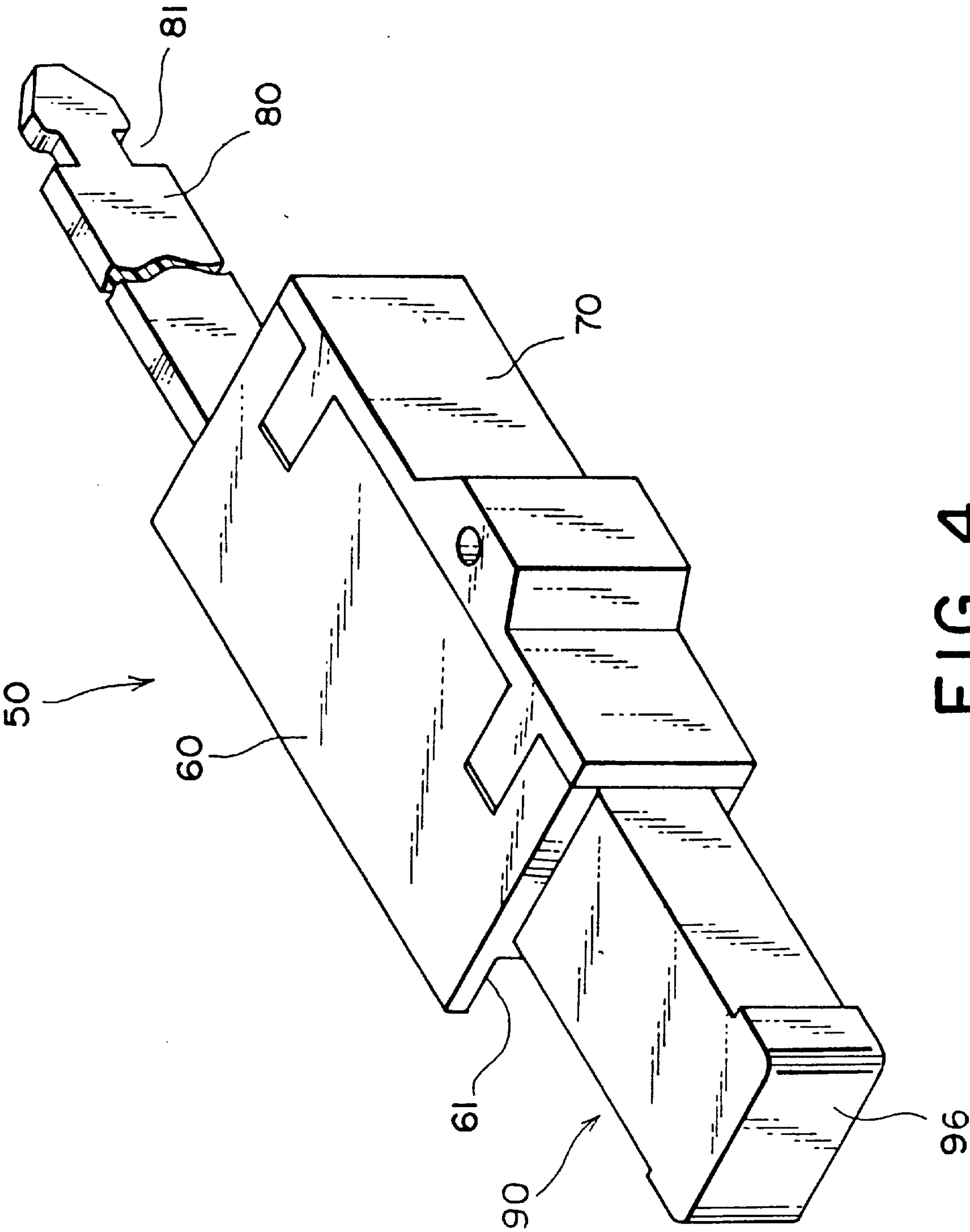


FIG. 4

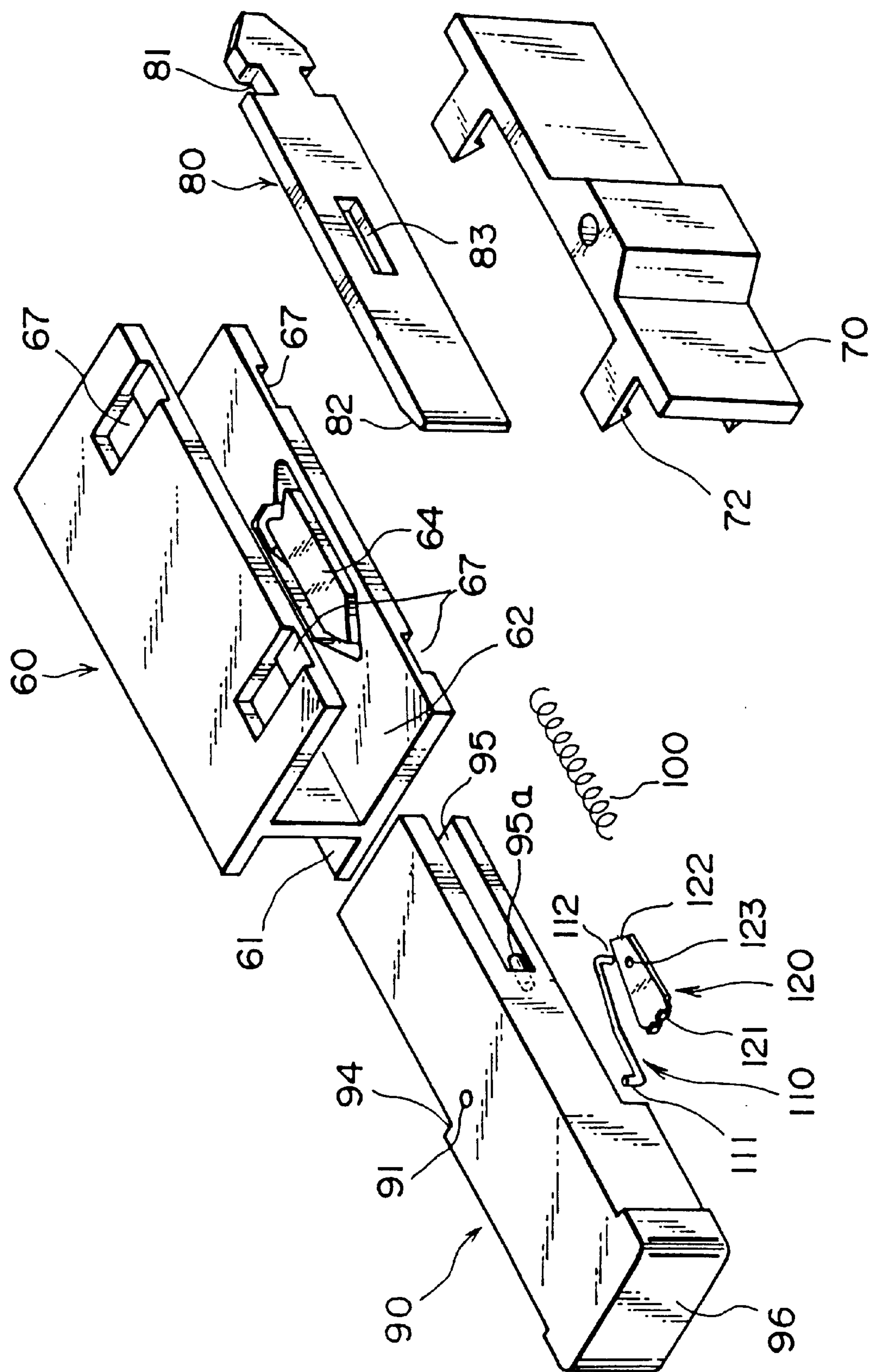


FIG. 5

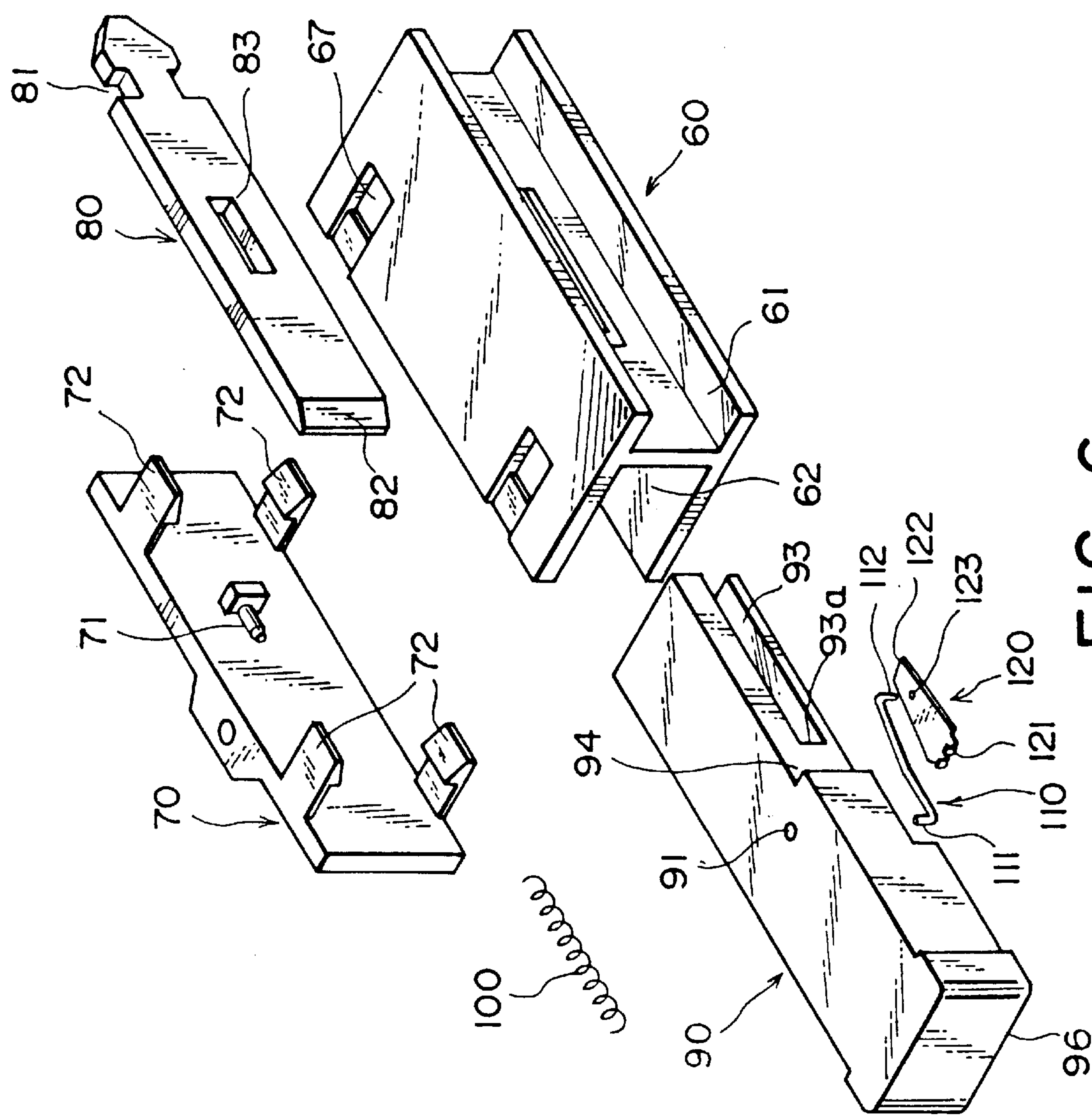


FIG. 6

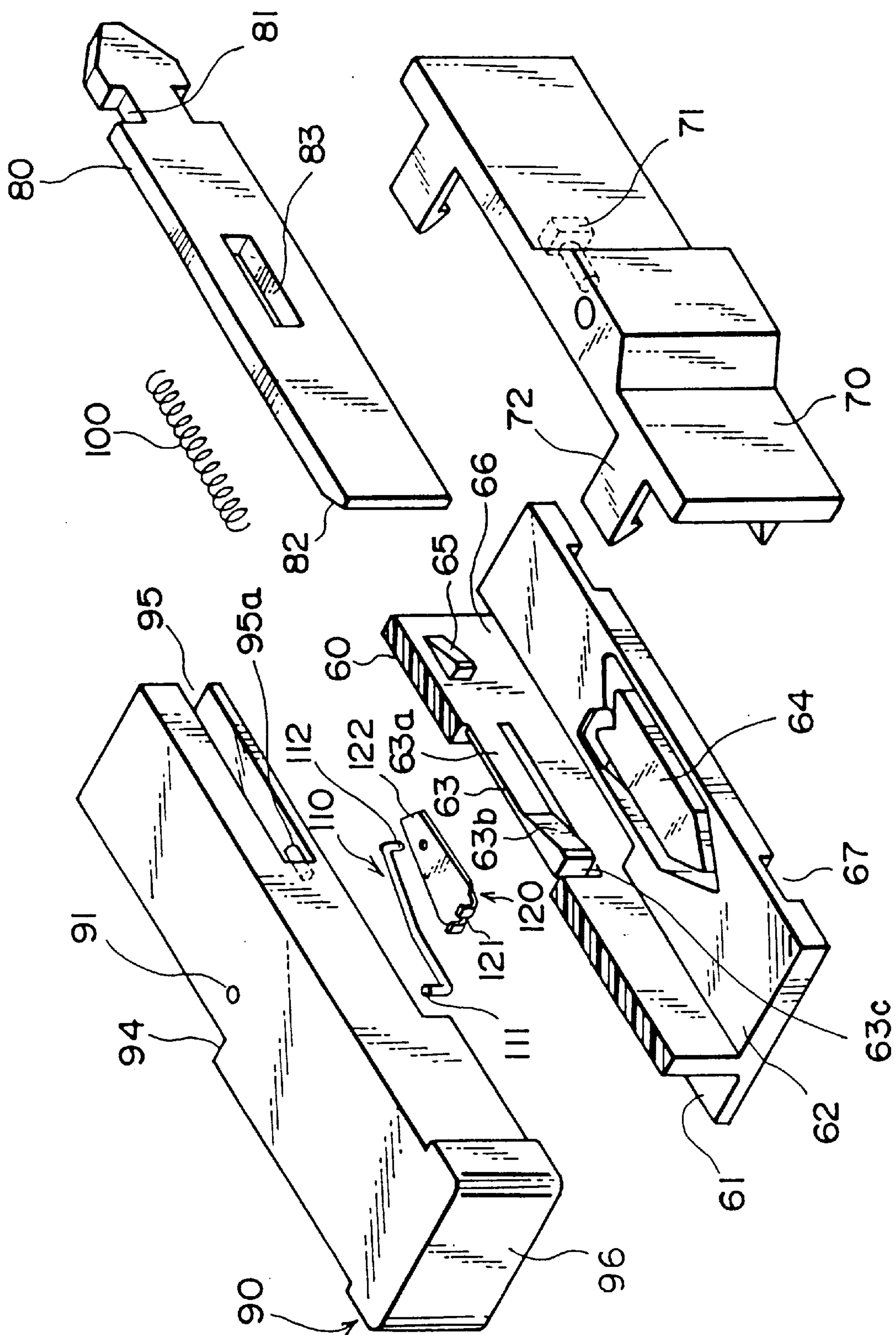


FIG. 7

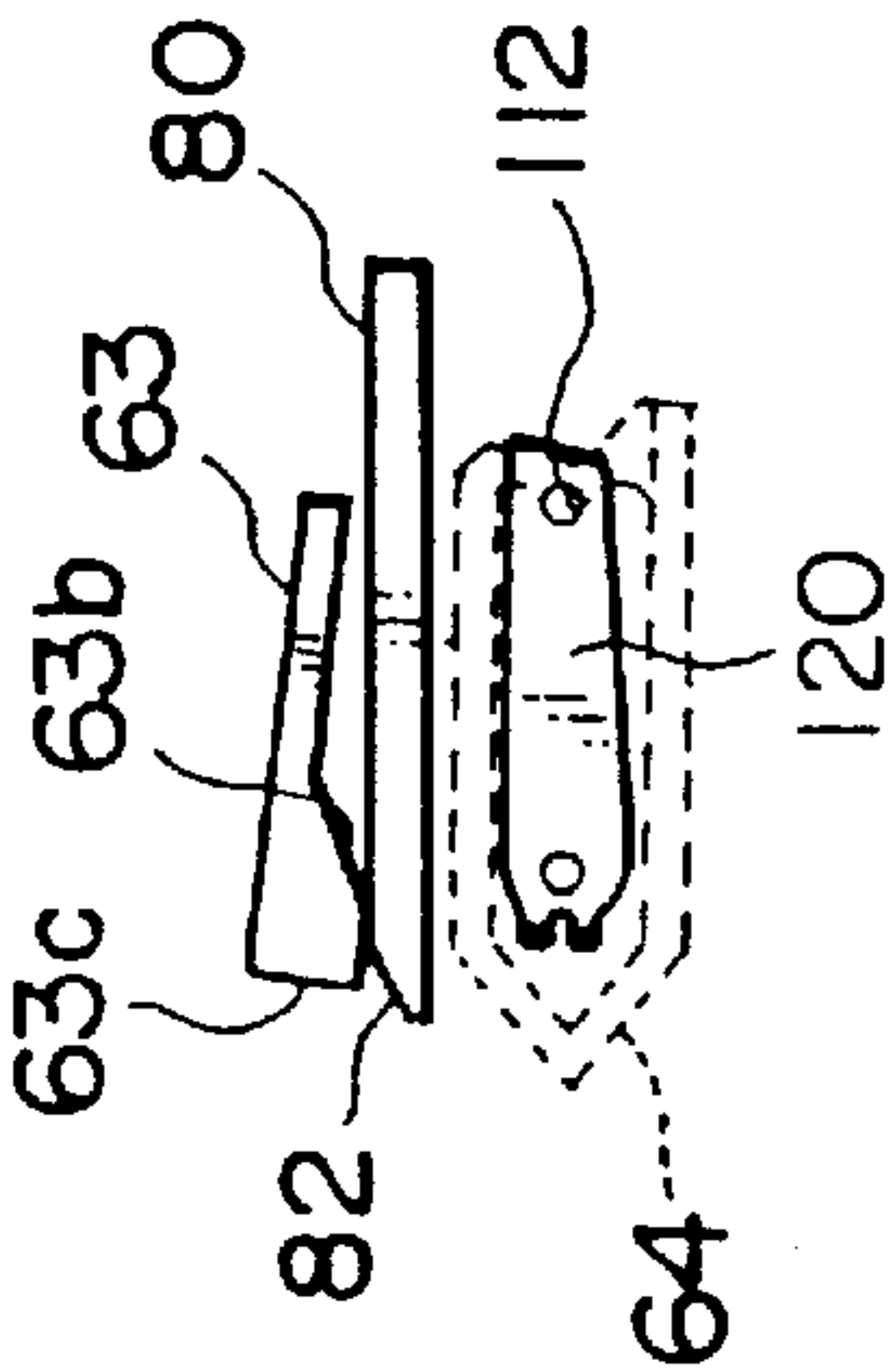


FIG. 9A

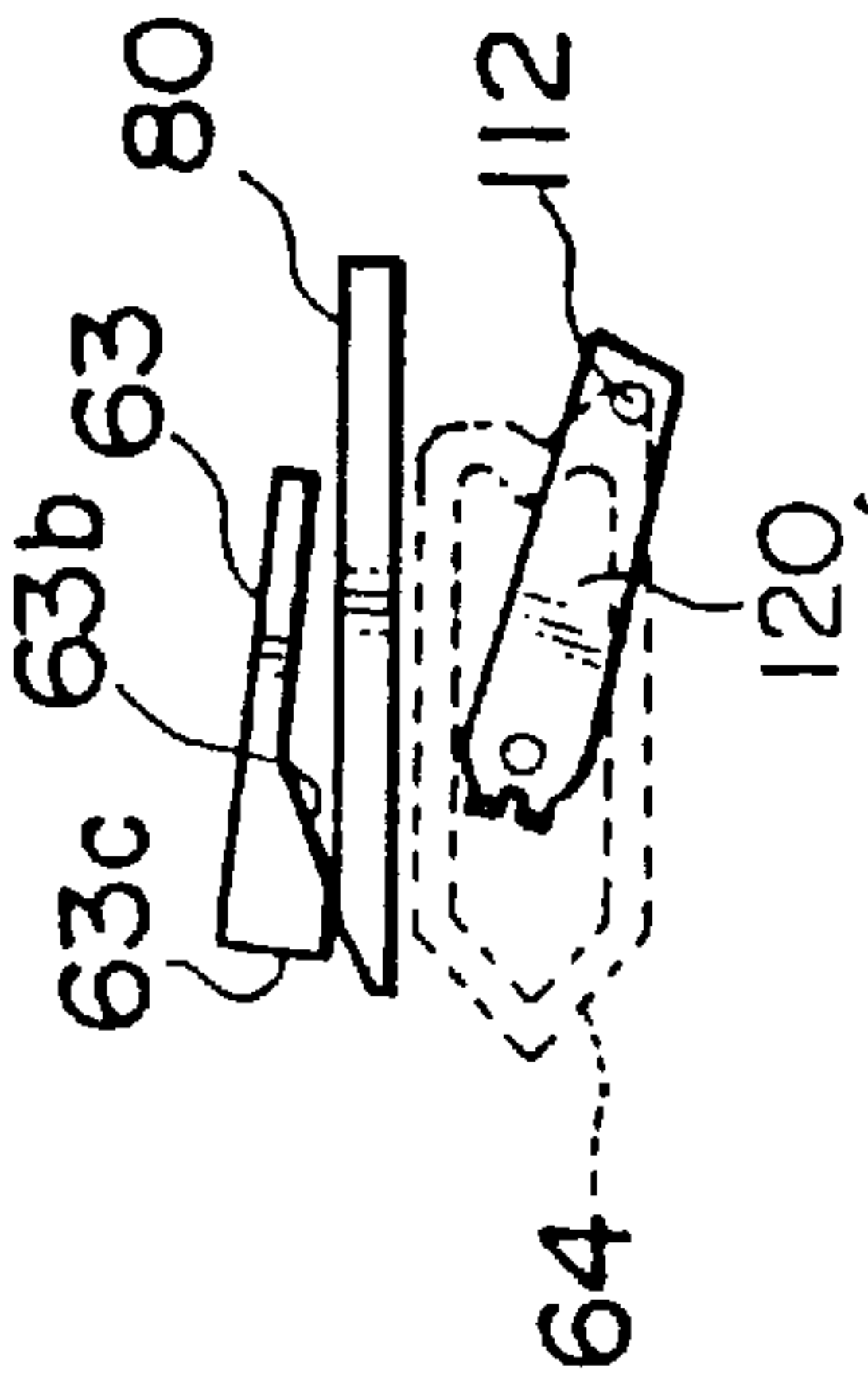


FIG. 9B

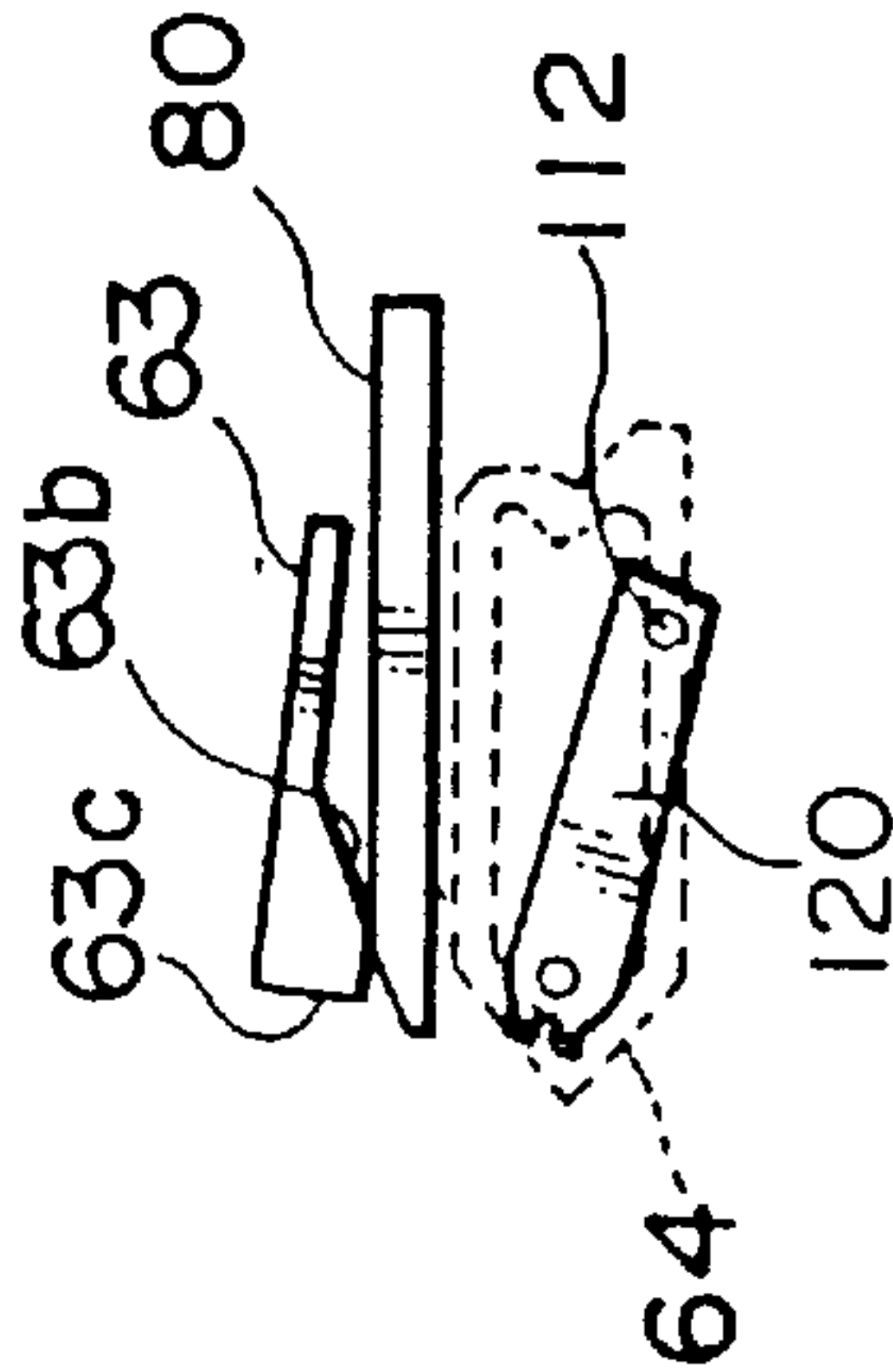


FIG. 9C

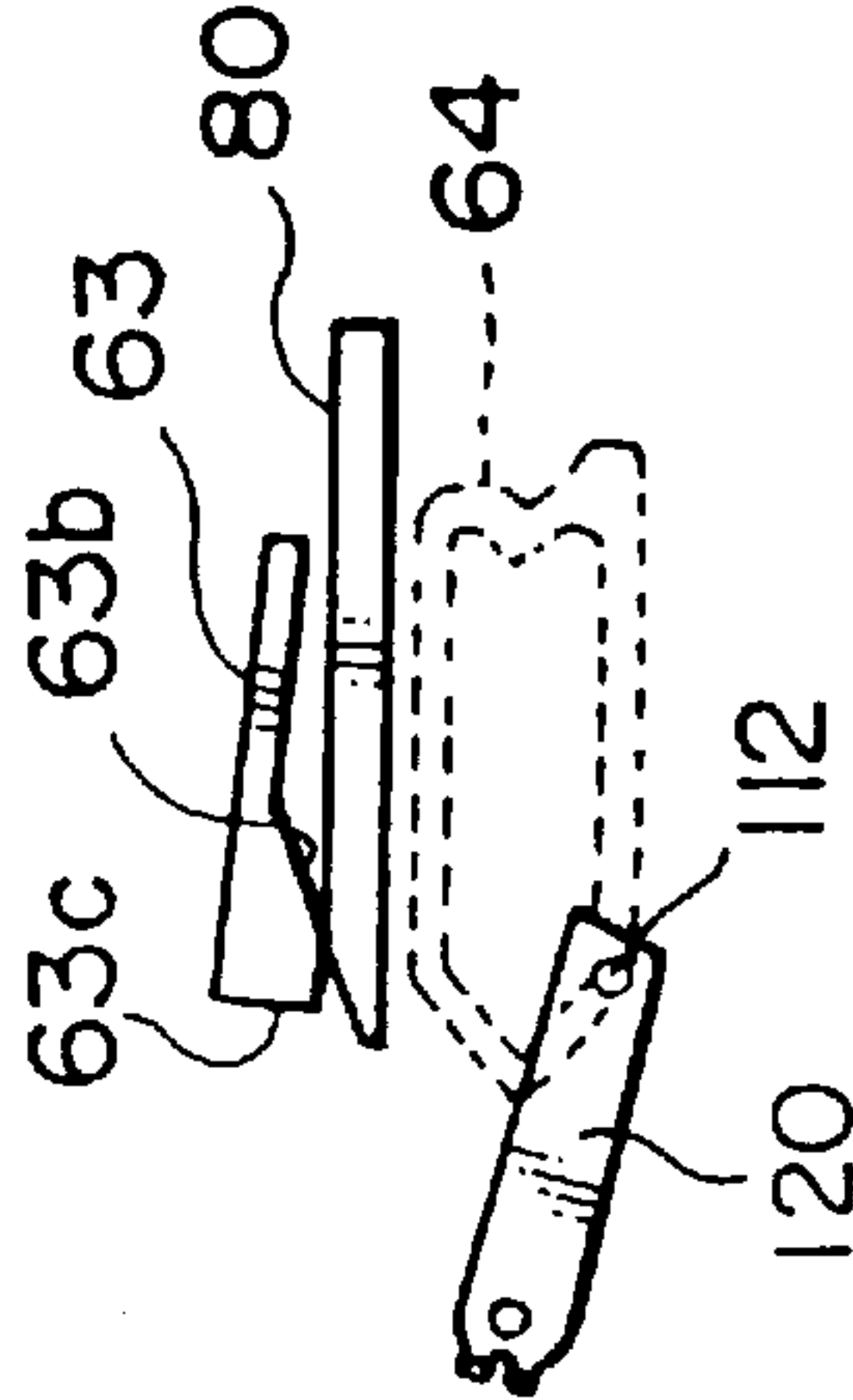


FIG. 9D

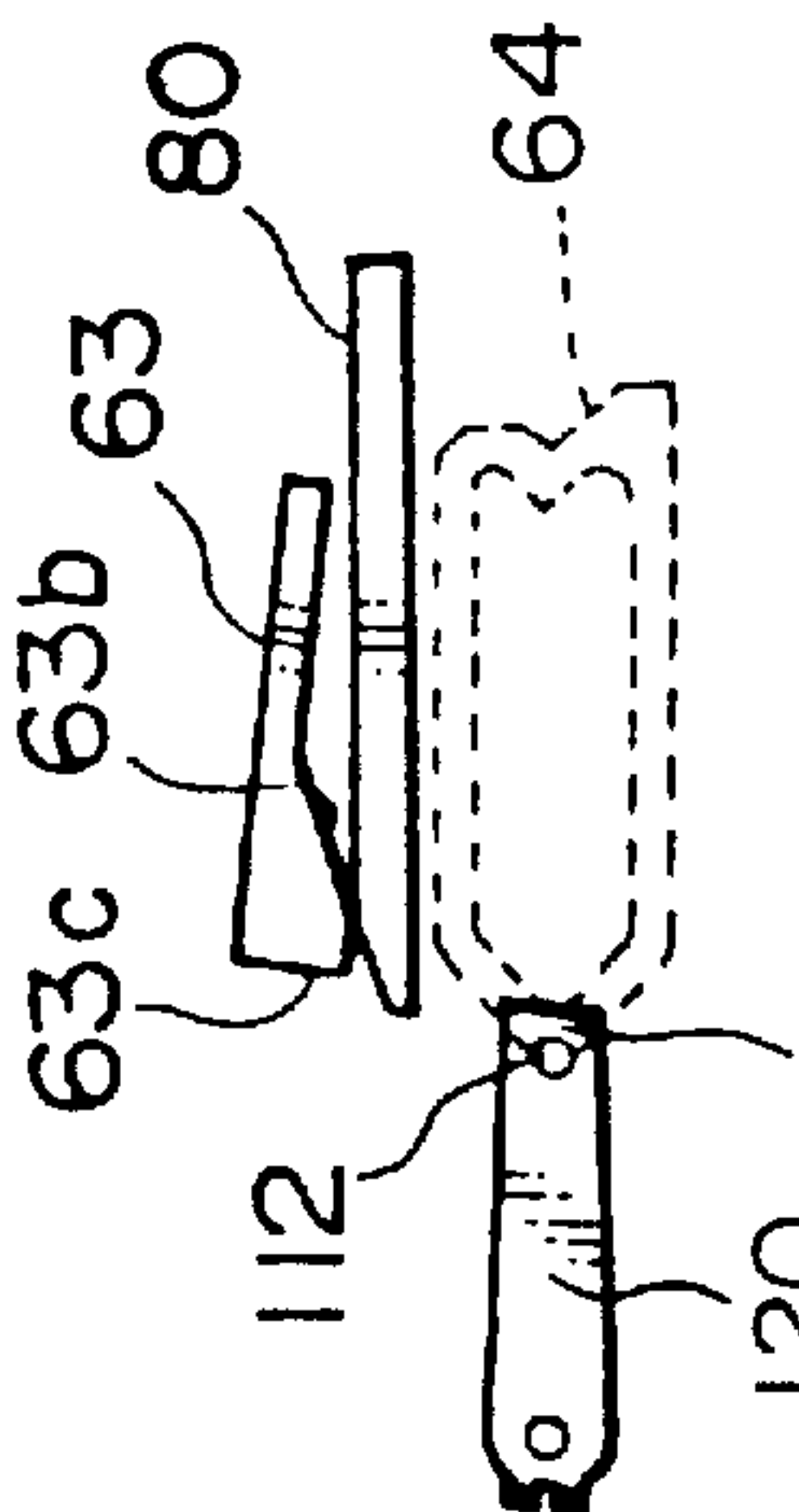


FIG. 9E

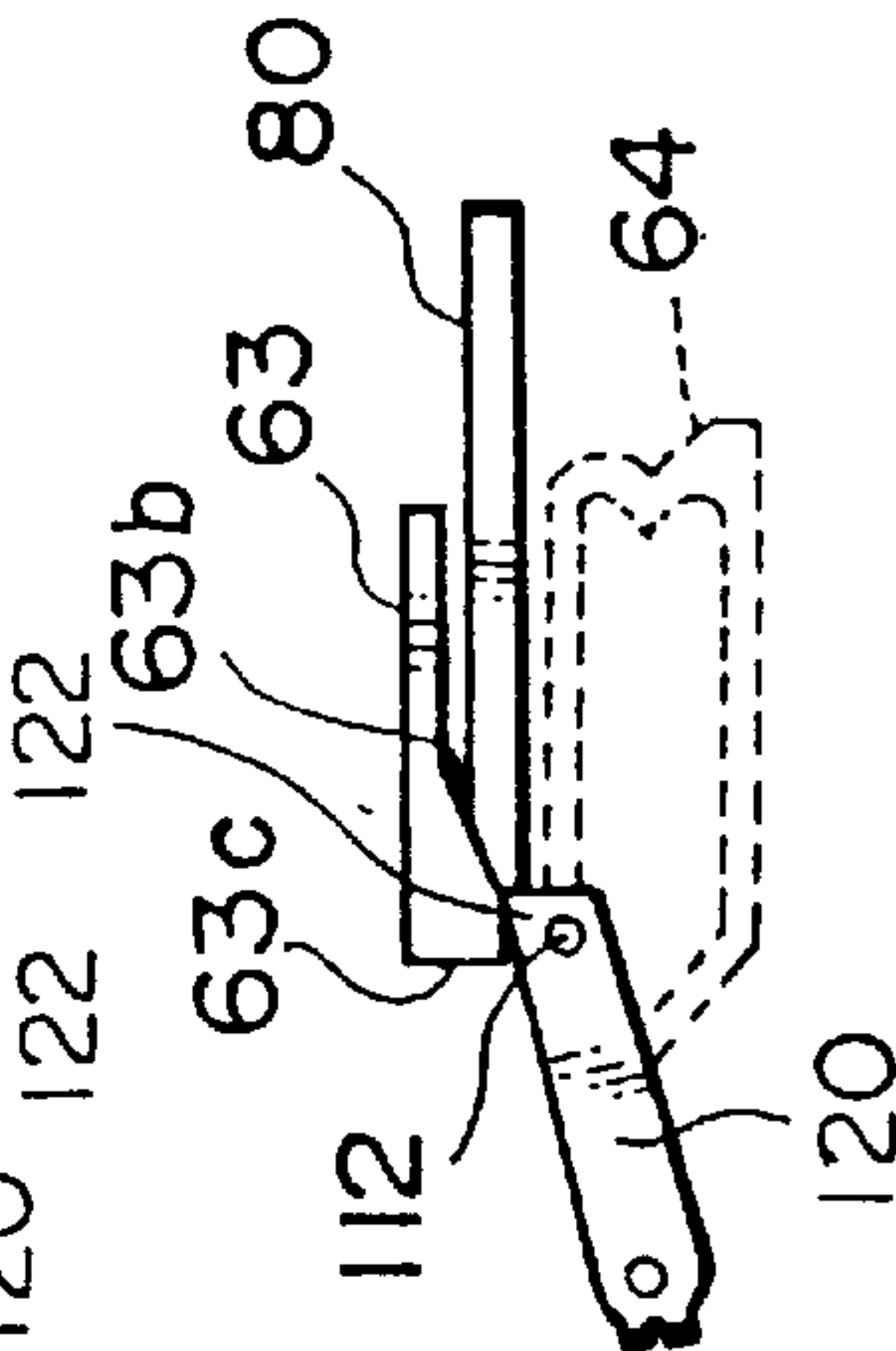


FIG. 9F

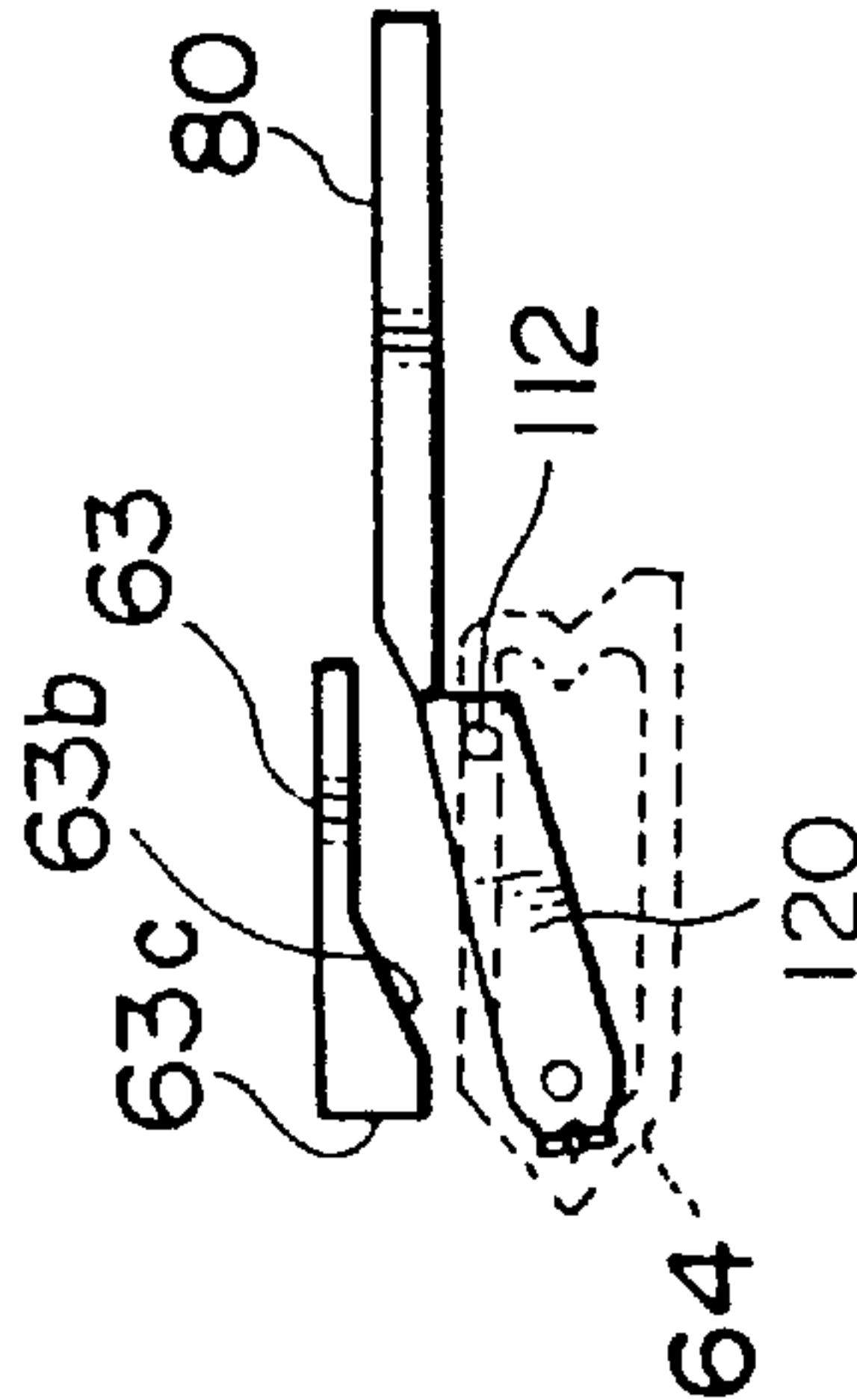


FIG. 9G

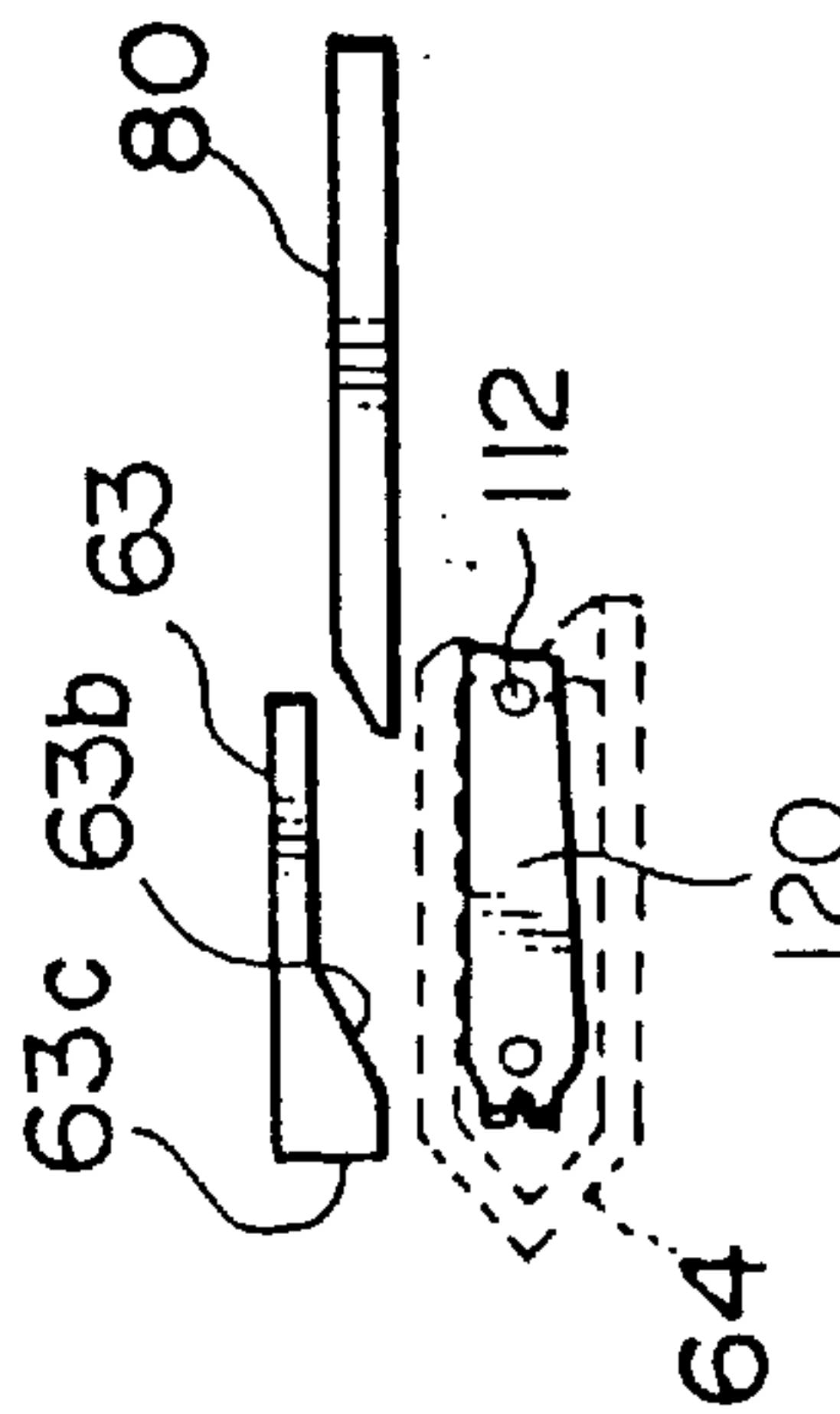


FIG. 9H

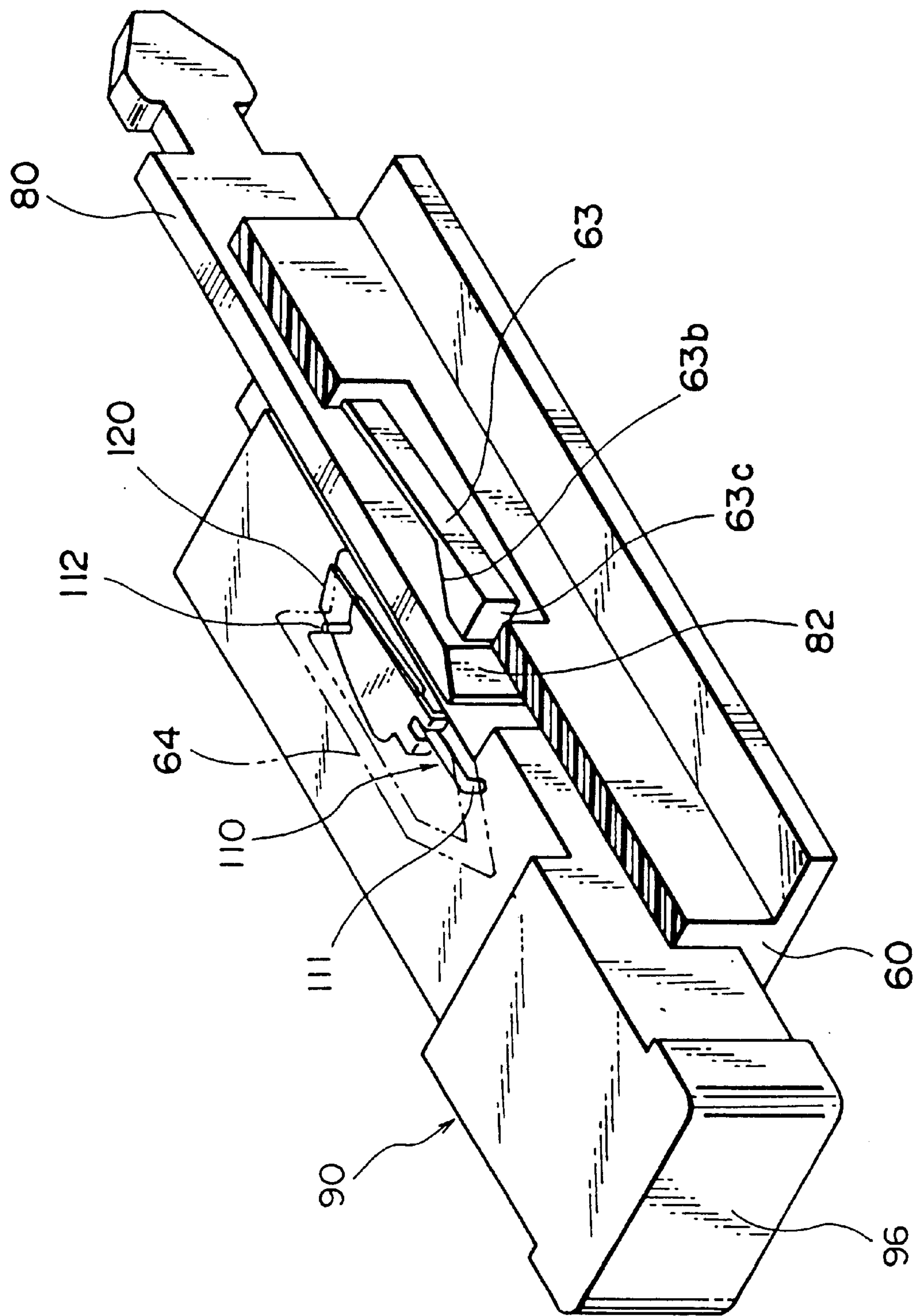


FIG. 10

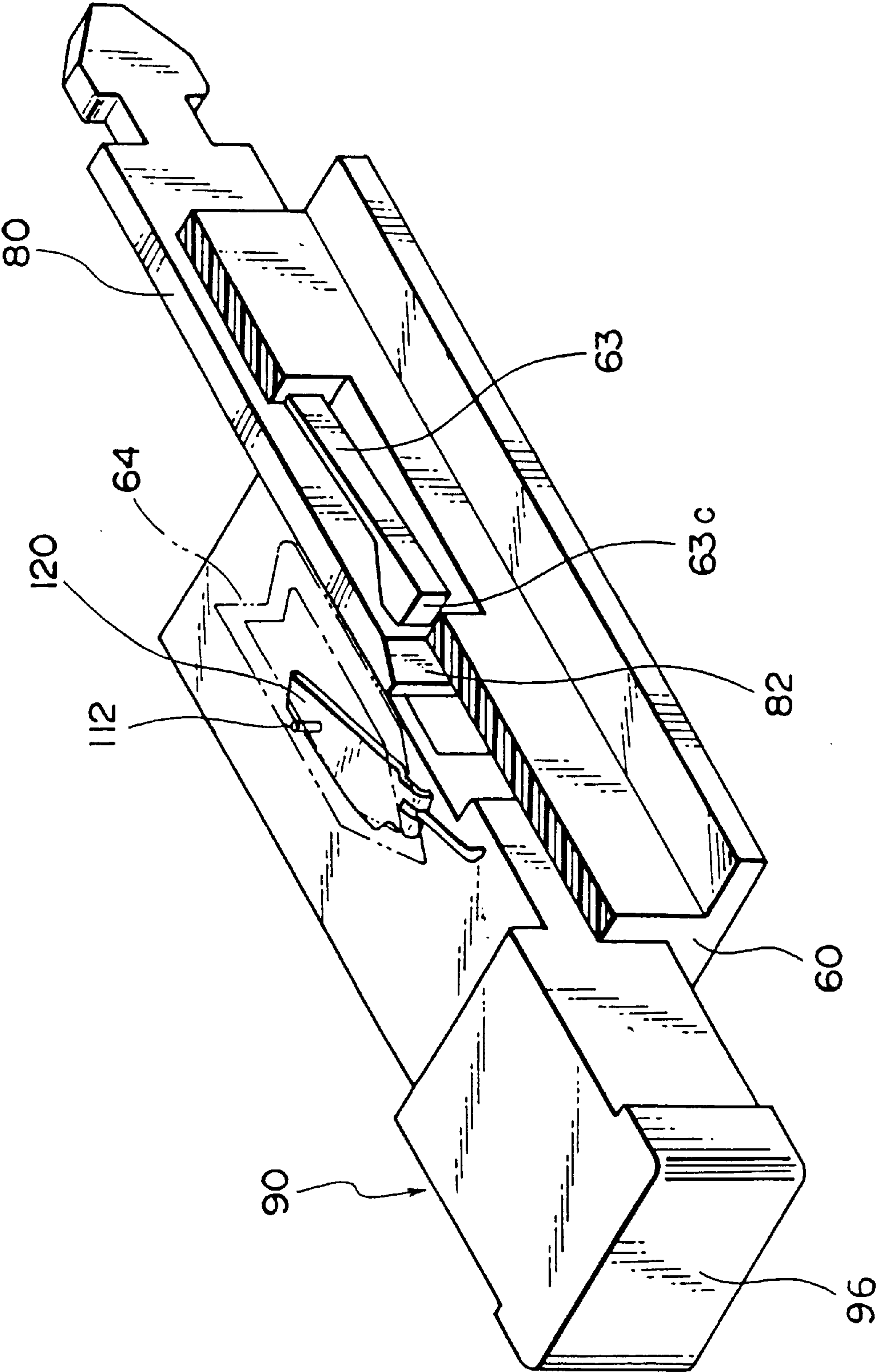


FIG. 11

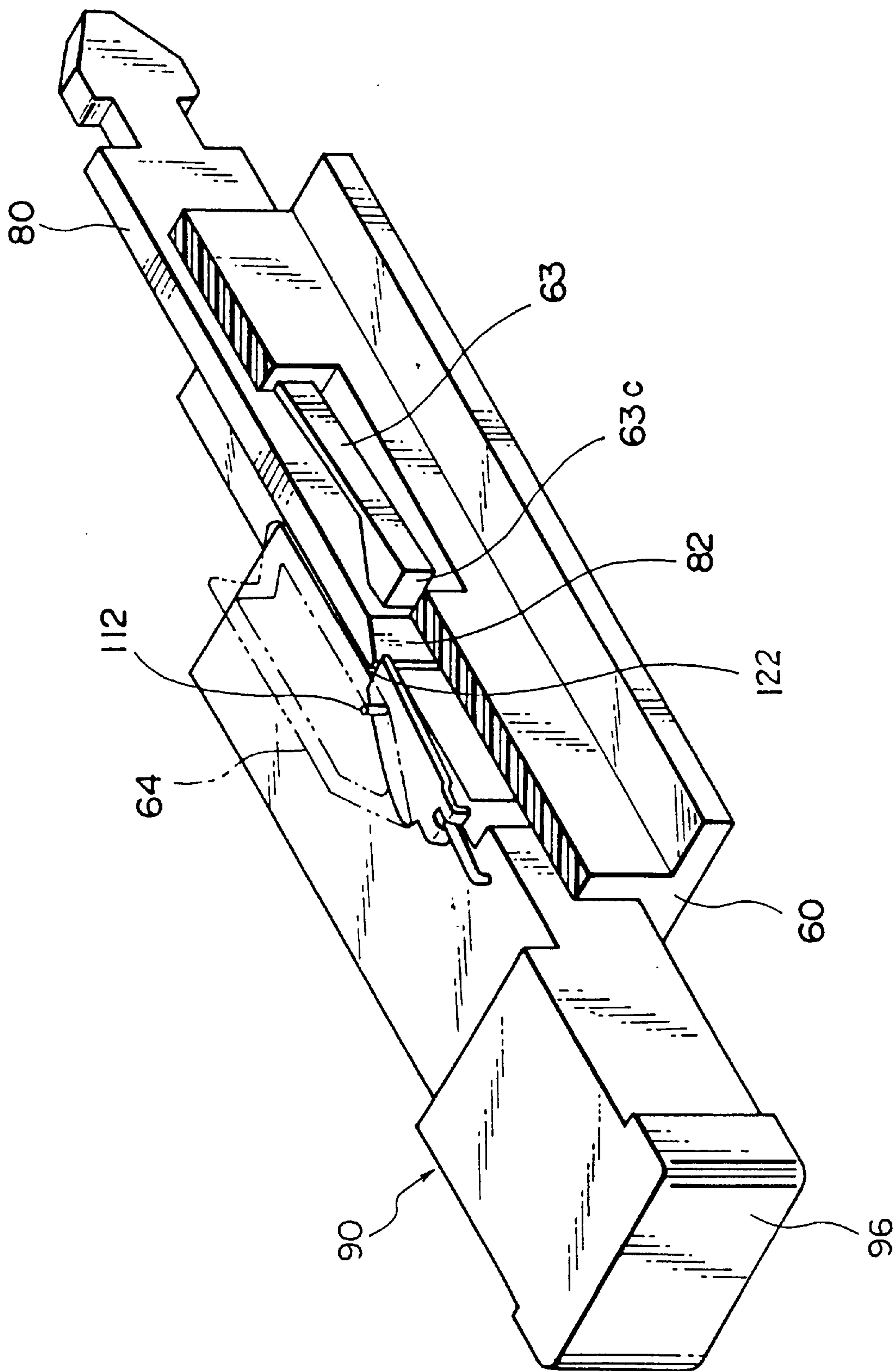


FIG. 12

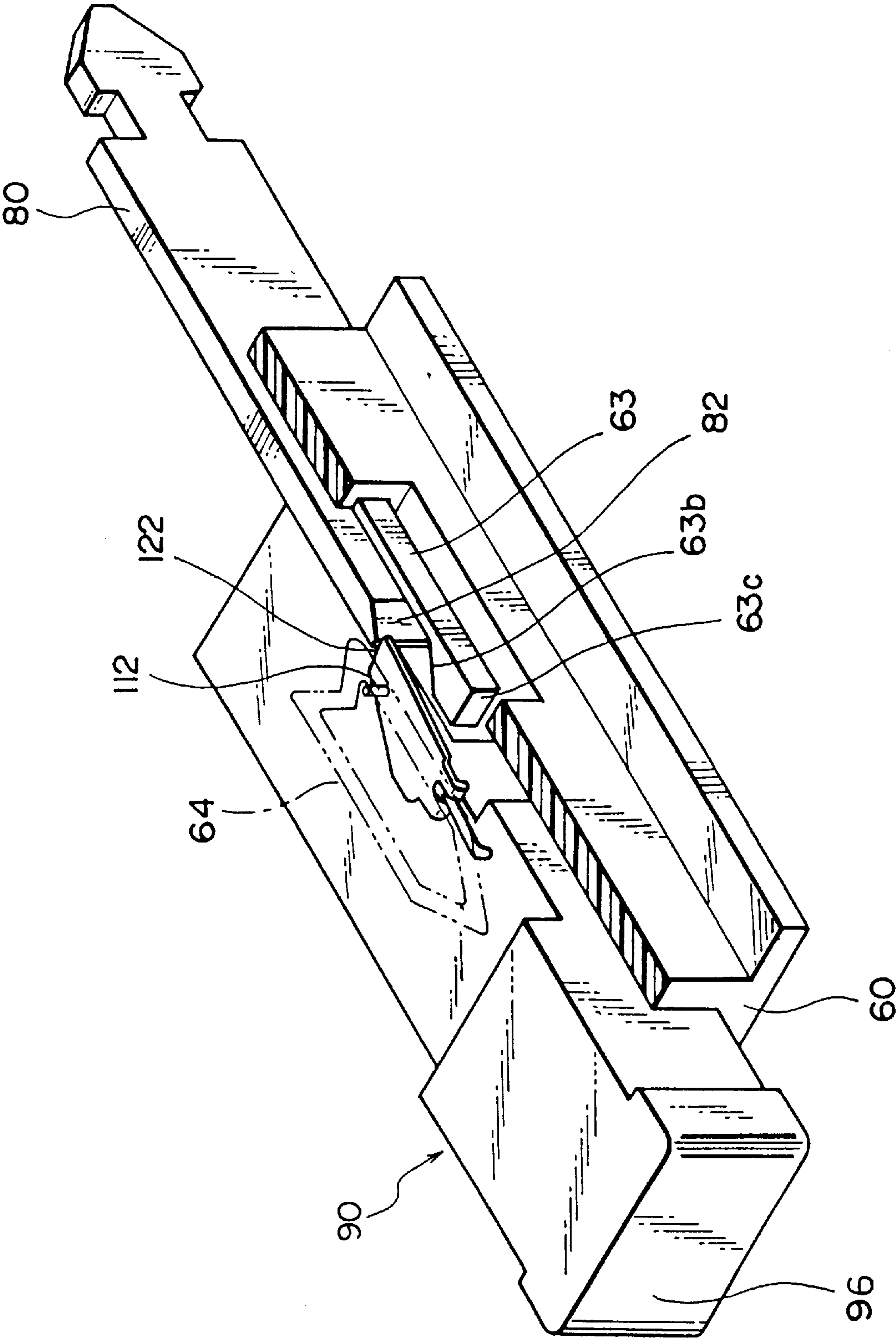


FIG. 13

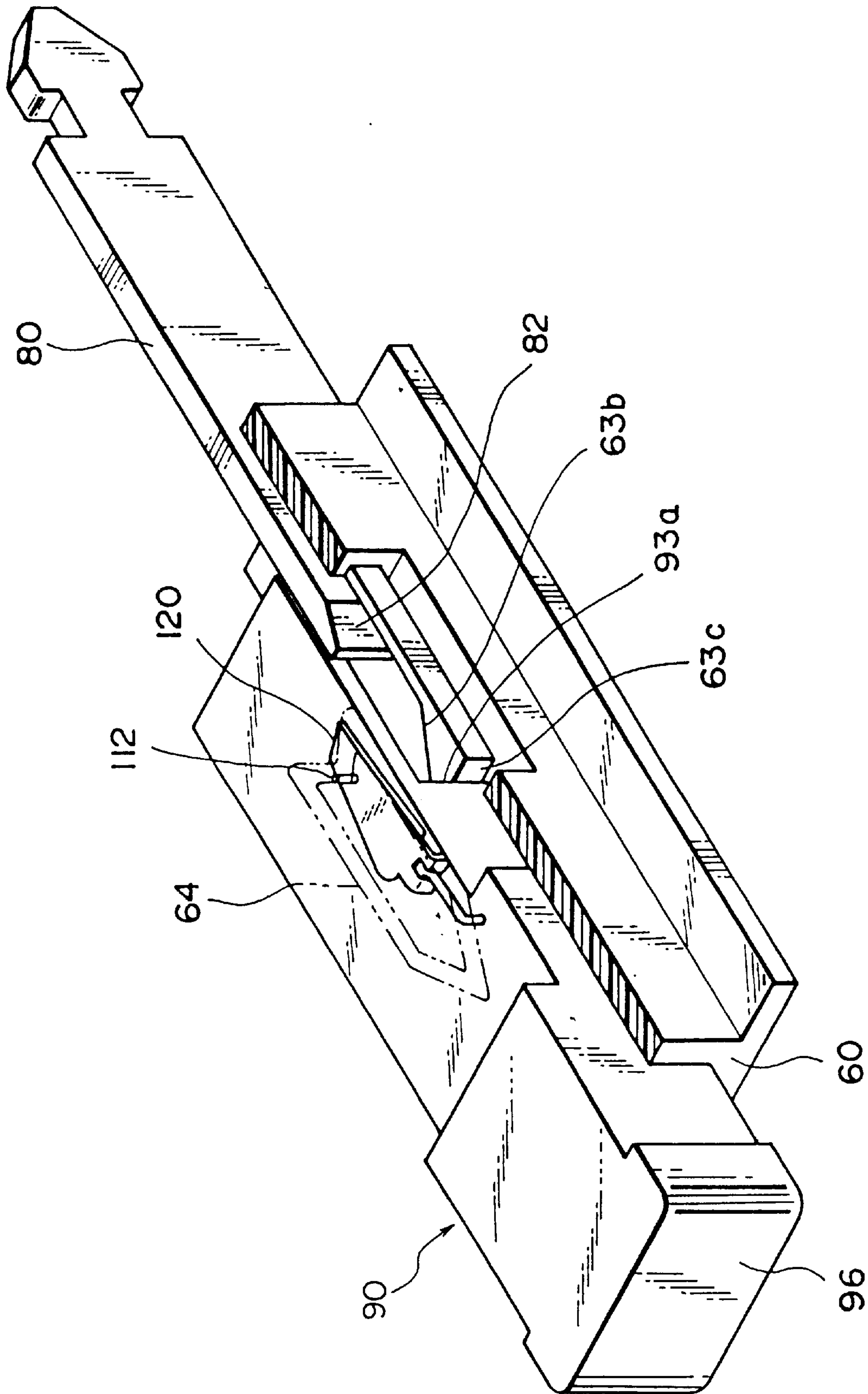


Fig. 14

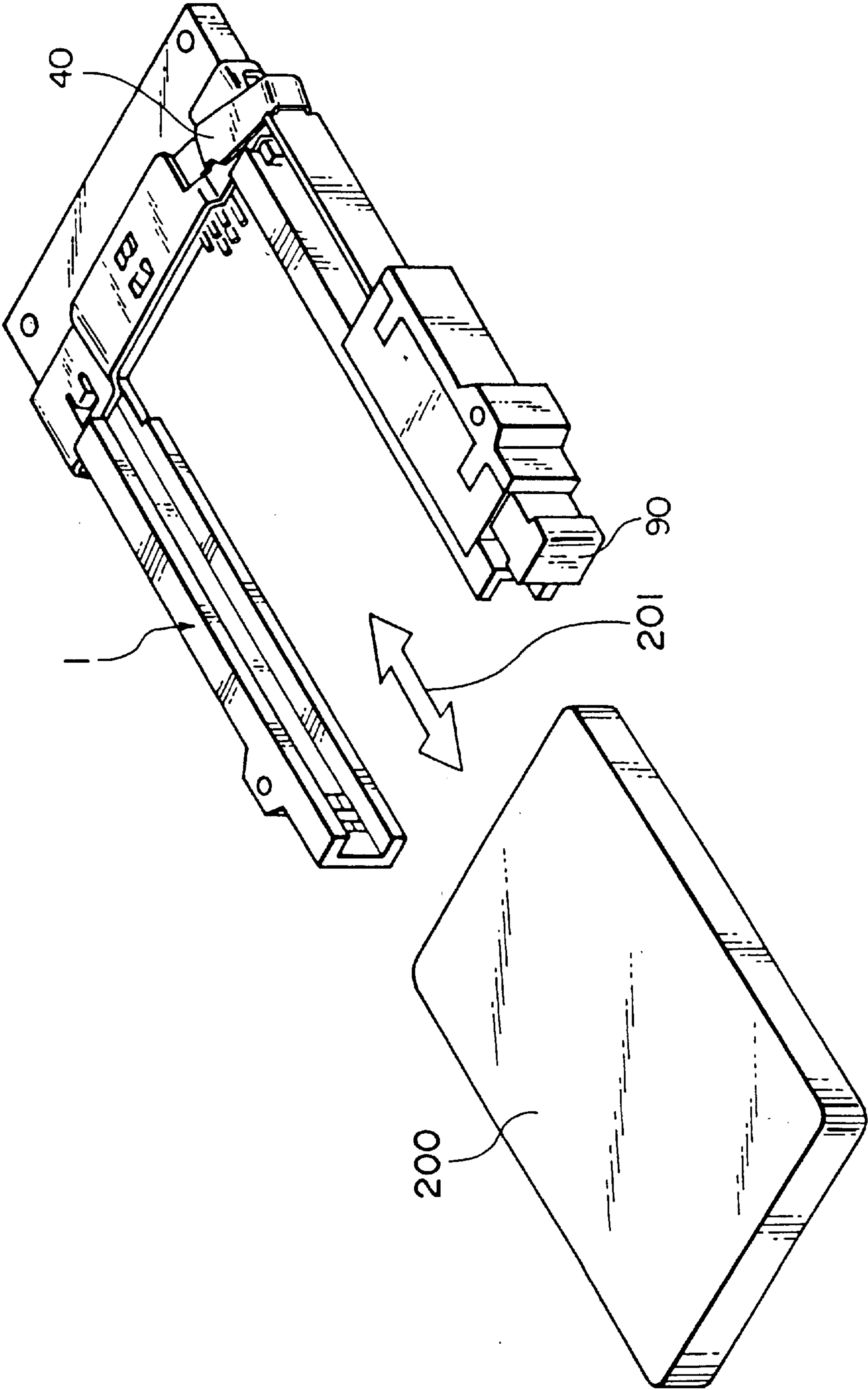


FIG. 15

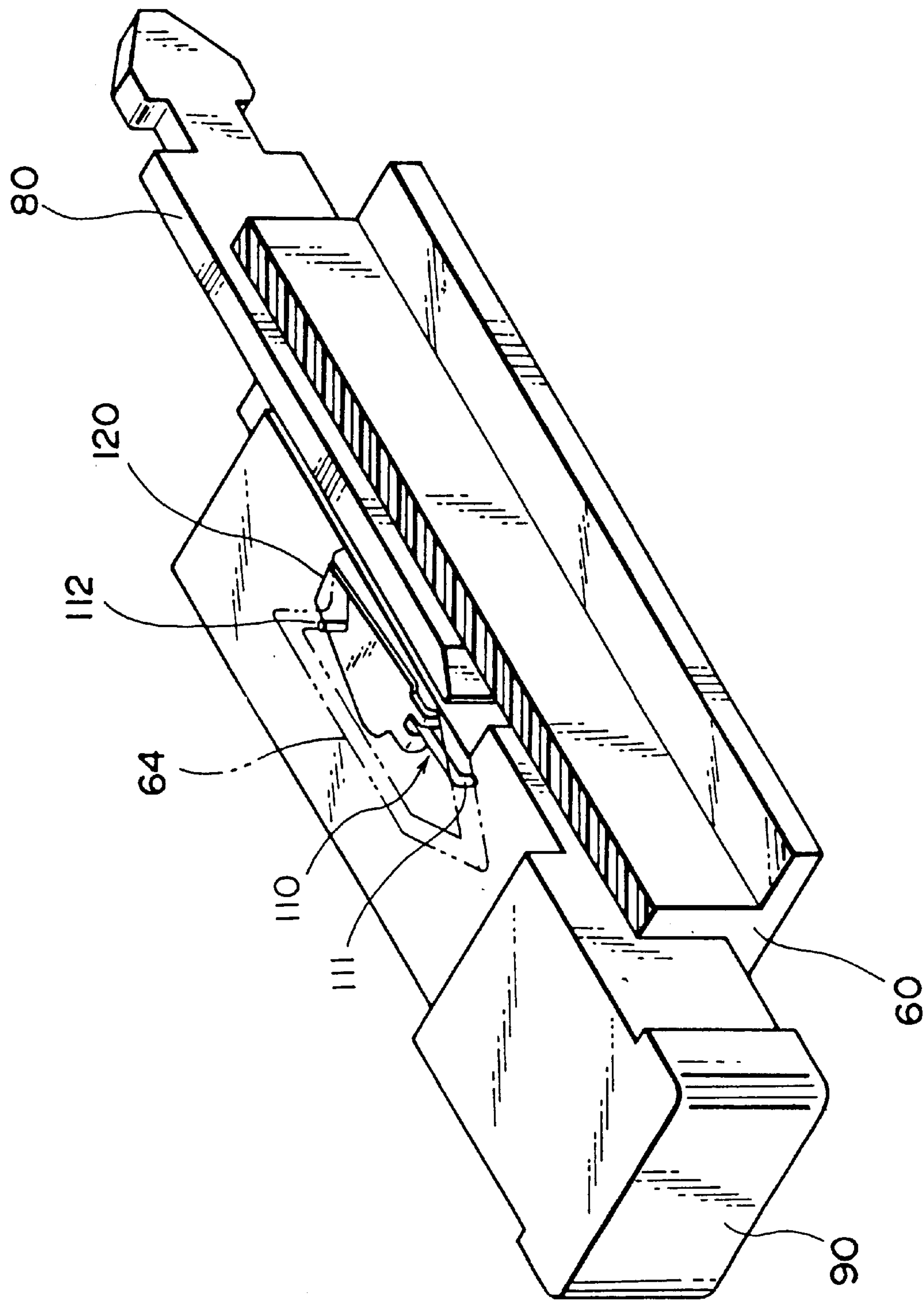


FIG. 16

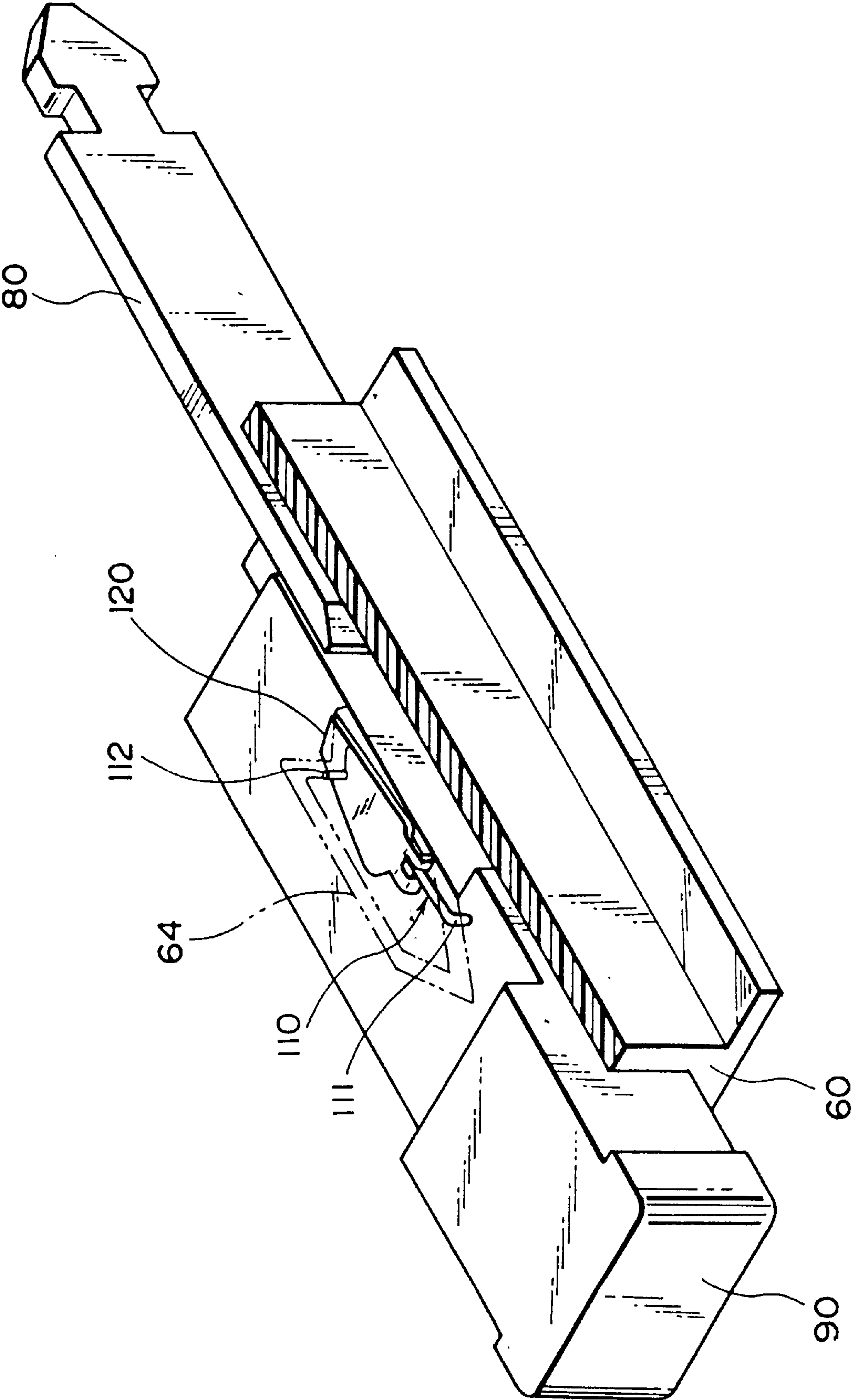


FIG. 17

CARD CONNECTOR WHICH CAN PREVENT ERRONEOUS OPERATION OF AN EJECT BUTTON

BACKGROUND OF THE INVENTION

The present invention relates to a connector for connecting a card-shaped connection object (hereinafter referred to as "card connector") and, in particular, to a card connector for allowing a PC card or the like to be inserted or loaded thereinto and released or unloaded therefrom.

A conventional card connector allows a card-shaped connection object, such as a PC card, to be loaded and unloaded in a first and a second direction. The card connector comprises a frame for receiving the connection object and an eject mechanism coupled to the frame and used for unloading the connection object. The eject mechanism comprises a button movable in the first and the second directions. The button is operated by an operator or operators to move in the first direction for causing the connection object be unloaded from the connector. When the connection object is loaded into the connector, the button is moved in the second direction.

In the conventional card connector, however, the button is projected to some degree and is further operable in either of the state wherein the connection object is loaded and the state wherein the connection object is not loaded. As a result, there has been a problem that a user may touch and operate the button in error.

SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a card connector which can prevent the foregoing erroneous operation in the state wherein no connection object is loaded in the card connector.

Other object of the present invention will become clear as the description proceeds.

A card connector to which the present invention is applicable is for connecting a card-shaped connection object which is loaded into the connector in a first direction. The connector comprises a frame for receiving the connection object, a button coupled to the frame and operated to move in the first direction for causing the connection object to be unloaded from the connector, and a position control mechanism connected to the frame and the button for controlling a position of the button so that the button is cyclically movable among a first, a second, and a third position, the first position being between the second and the third positions in the first direction.

According to an aspect of this invention, there is provided a card connector which comprises a frame allowing a card-shaped connection object to be loaded thereinto and unloaded therefrom in given directions, a plate provided on the frame so as to be movable in the given directions and arranged to contact with the connection object, a lever provided on the frame so as to be turnable and coupled at one end thereof to the plate, and an eject mechanism coupled to the lever. In the card connector, the eject mechanism comprises a button movable along the given directions, an urging member connected to the button for urging the button so that a push-side end of the button projects from a given wall, an eject bar coupled to the frame and the other end of the lever and movable along the given directions, and a movement control mechanism interposed between the button and the eject bar for controlling the button to cyclically move among a first position where the push-side end projects from the

given wall to a small degree, a second position where the push-side end projects from the given wall to the smallest a degree, and a third position where the push-side end projects from the given wall to the greatest degree, the movement control mechanism transmitting the movement of the button to the eject bar when the button moves from the third position to the second position.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view showing a card connector according to an embodiment of the present invention;

FIG. 2 is an exploded perspective view of the card connector shown in FIG. 1;

FIG. 3 is a perspective view showing an eject mechanism of the card connector shown in FIG. 1, wherein a button is in an initial position;

FIG. 4 is a perspective view showing the eject mechanism of the card connector shown in FIG. 1, wherein the button is in a projected position;

FIG. 5 is an exploded perspective view of the eject mechanism shown in FIGS. 3 and 4;

FIG. 6 is an exploded perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4;

FIG. 7 is a partly cut-out exploded perspective view of the eject mechanism shown in FIGS. 3 and 4;

FIG. 8 is an enlarged perspective view of a heart cam of the eject mechanism shown in FIGS. 3 and 4;

FIGS. 9A to 9H are diagrams for explaining an operation of the card connector shown in FIG. 1;

FIG. 10 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4, wherein the button is in the initial position;

FIG. 11 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4, wherein the button is being projected;

FIG. 12 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4, wherein the button is being pushed again;

FIG. 13 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4, wherein the button is being pushed again;

FIG. 14 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism shown in FIGS. 3 and 4, wherein the button is in the initial position;

FIG. 15 is a perspective view showing a card connector according to another embodiment of the present invention;

FIG. 16 is a partly cut-out perspective view, as seen from a rear side, of an eject mechanism included in the card connector of FIG. 15, wherein a connection object is loaded; and

FIG. 17 is a partly cut-out perspective view, as seen from a rear side, of the eject mechanism of illustrated in FIG. 16, wherein the connection object is not loaded.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 15 to 17, description will be made as regards a card connector according to an embodiment of this invention. The card connector is designated by a reference numeral 1 and allows a card-shaped connection object 200, such as a PC card, to be loaded and unloaded in given directions or a first and a second directions 201. In the card connector 1, an eject mechanism is used for unloading the

connection object **200** and comprises, as shown in FIGS. **16** and **17**, a button **90** movable in the directions **201**, an eject bar **80** movable along the directions **201** and coupled to an unloading lever **40**, and a movement control mechanism interposed between the button **90** and the eject bar **80** so as to retain the button **90** in a given position and transmit the movement of the button **90** to the eject bar **80**.

The shown movement control mechanism comprises a spring **110** having one end (button engaging portion) **111** pivotally attached to the button **90**, a contact plate **120** attached to the spring **110** and intermittently contacting the eject bar **80**, and a heart cam **64** for retaining the other end (cam engaging portion) **112** of the spring **110** in given positions and allowing the contact plate **120** to abut the eject bar **80** during movement of the button **90** to a given position. As appreciated, FIG. **16** is an explanatory diagram showing the state wherein the connection object **200** is loaded, while FIG. **17** is an explanatory diagram showing the state wherein the connection object **200** is not loaded.

Turning to FIGS. **1** and **2**, the description will be directed to a card connector according to another embodiment of the present invention. Similar parts are designated by like reference numerals. The card connector comprises a frame **20**, a plate **30**, a lever **40** and an eject mechanism or unit **50**.

The frame **20** is made of an insulating material and allows a card-shaped connection object **200** to be inserted or loaded thereinto and released or unloaded therefrom in given directions **201**. The frame **20** comprises a pair of guide grooves **21** for guiding the connection object **200** therealong, a rotation shaft **22** for the lever **40**, and a mounting portion **23** for the eject mechanism **50**. Further, the frame **20** is formed with a pair of stepped portions **24**, and provided with a number of conductive contacts **11**, **12** in parallel.

The plate **30** is obtained by, for example, pressing a metal plate. The plate **30** is provided on the frame **20** so as to be movable in the directions **201**, and arranged to contact with the connection object **200** inserted into the frame **20**. The plate **30** has a pair of bent portions **31**, an engaging portion **32** relative to the lever **40**, and a pair of abutting portions **33** for abutting with an end surface of the connection object **200**. By engaging the bent portions **31** of the plate **30** with the stepped portions **24** of the frame **20**, the plate **30** is mounted on the frame **20** so as to be movable in the directions **201**.

The lever **40** is obtained by, for example, pressing a metal plate. The lever **40** comprises a shaft hole **41** for receiving therein the rotation shaft **22** of the frame **20**, an engaging portion **42** relative to the plate **30**, and a coupling portion **43** relative to the eject mechanism **50**. The lever **40** is turnably or pivotally disposed on the frame **20**, and has one end coupled to the plate **30** and the other end coupled to the eject mechanism **50**. In FIG. **2**, numerals **101** and **102** denote ground terminals for the escape of undesired current inside the connection object **200** to the exterior thereof. The ground terminals **101** and **102** are attached to the tip portions of the frame **20**.

Referring to FIGS. **3** to **7**, the eject mechanism **50** comprises a casing **60**, a cover **70**, a button **90** movable along the directions **201**, a coil spring (urging member) **100** for biasing the button **90**, an eject bar **80** movable along the directions **201** and coupled to the other end of the lever **40**, a spring **110** having one end (button engaging portion) **111** pivotally attached to the button **90**, and a contact plate **120**. The eject mechanism **50** is formed into a unit by the casing **60** and the cover **70**.

The casing **60** has a fixing groove **61** at one side of an intermediate wall, and a button slide groove **62** at the other

side thereof. The casing **60** is fixed to the frame **20** by fitting the fixing groove **61** over the mounting portion **23** of the frame **20**. The button slide groove **62** receives therein the button **90** so as to be movable in the directions **201**. Cover fixing grooves **67** are formed on the upper and lower sides of the casing **60**. Further, the intermediate wall of the casing **60** is formed with a stopper **63** having a plate spring **63a**, a tapered portion **63b** and an end portion **63c**. The end portion **63c** can be projected or retreated relative to a later-described stopper groove **93** of the button **90** via the button slide groove **62**, and is projected into the stopper groove **93** when the connection object **200** is not loaded.

On the bottom of and in the interior of the button slide groove **62**, a heart cam **64** is formed. As shown in FIG. **8**, the heart cam **64** has a recessed portion **64a**, a first step **64b**, a first wall **64c**, a first groove **64d**, a first inclined portion **64e**, a second step **64f**, a second wall **64g**, a second groove **64h**, a second inclined portion **64i**, a third step **64j**, a third wall **64k**, a third groove **64l** and a third inclined portion **64m**. Since the heart cam **64** is formed on the casing **60**, it is fixed relative to the frame **20**. The heart cam **64** receives a later-described cam engaging portion **112** of the spring **110** and functions to transfer it in one-way directions and retain it in given positions.

Behind the foregoing stopper **63**, an eject bar stopper **65** is provided on the intermediate wall of the casing **60**. Further, the bottom of the casing **60** is formed with an eject bar slide groove **66** extending along the intermediate wall of the casing **60**. The eject bar slide groove **66** receives the eject bar **80** so as to be movable in the directions **201**.

The cover **70** is formed with a coil spring retaining horn **71** and fixing pawls **72**. By fitting the fixing pawls **72** into the cover fixing grooves **67** of the casing **60**, the cover **70** is fixed to the casing **60**. This prevents the button **90** from falling off from the button slide groove **62**.

The button **90** has a spring fixing hole **91**, the stopper groove **93**, a step **94** and a coil spring receiving groove **95**. As appreciated, one end of the button **90** is formed as a push-side end **96** which is pushed by a finger. The stopper groove **93** receives the end portion **63c** of the stopper **63** so as to be movable relative to the stopper groove **93** in the directions **201**, while having a stopper surface **93a** which engages with the end portion **63c** of the stopper **63**, when the connection object **200** is not loaded in the frame **20** and the button **90** is in a first position, for prohibiting the movement of the button **90** to a second position, which will be described later in detail. Further, a coil spring retaining horn **95a** is provided on the bottom of the coil spring receiving groove **95**.

The coil spring **100** is disposed between the coil spring retaining horn **71** of the cover **70** and the coil spring retaining horn **95a** of the button **90**. The coil spring **100** produces an urging force in a direction to project the push-side end **96** of the button **90** from a given wall, for example, a casing of an electronic device (not shown).

The eject bar **80** is provided with a coupling portion **81**, a tapered portion **82** and a stopper groove **83**. The eject bar **80** is coupled to the lever **40** through engagement between the coupling portion **81** thereof and the coupling portion **43** of the lever **40**. The eject bar **80** is movable within the eject bar slide groove **66** of the casing **60** and prevented from falling off from the casing **60** through engagement between the eject bar stopper **65** and one end of the stopper groove **83**.

When the connection object **200** is loaded into the L frame **20**, the eject bar **80** is moved toward the end portion **63c** of

the stopper **63** so as to engage with the end portion **63c** to force it out of the stopper groove **93** of the button **90**, in response to the movement of the plate **30** and the lever **40**. On the other hand, when the connection object **200** is unloaded from the frame **20** by pushing the button **90**, the eject bar **80**, following the movement of the button **90**, moves in a direction away from the end portion **63c** of the stopper **63** so as to release the engagement with the end portion **63c**.

The spring **110** is made of a metal rod having flexibility. The spring **110** is bent at its both ends to provide the button engaging portion **111** and the cam engaging portion **112**, respectively. The spring **110** is pivotally attached to the button **90** at the button engaging portion **111**. In the assembled state of the card connector **1**, the cam engaging portion **112** is inserted into the groove of the heart cam **64** and urged toward the bottom of the groove.

The contact plate **120** has a bifurcate portion **121**, an end portion **122** and a spring hole **123**. In the assembled state of the card connector **1**, the spring **110** is fitted into the bifurcate portion **121** and the cam engaging portion **112** of the spring **110** is fitted into the spring hole **123**, so that the contact plate **120** is attached to the spring **110**.

The spring **110**, the eject bar **80**, the contact plate **120** and the heart cam **64** cooperatively constitute a movement control mechanism. The movement control mechanism functions to cyclically retain the button **90** in the first position where the push-side end **96** of the button **90** projects from the given wall to a small degree, in the second position where the push-side end **96** projects from the given wall to the smallest degree, and in a third position where the push-side end **96** projects from the given wall to the greatest degree, and further functions to transmit the movement of the button **90** to the eject bar **80** when the button **90** moves from the third position to the second position.

The stopper **63** of the casing **60**, the eject bar **80** and the stopper groove **93** of the button **90** cooperatively constitute a stopper mechanism. When the button **90** is pushed for moving it from the first position to the second position while the connection object **200** is not loaded in the frame **20**, the stopper mechanism functions prohibits the movement of the button **90** so as to retain the button **90** in the first position.

Now, an operation of the card connector **1** according to this embodiment will be described.

First, when the connection object **200** is loaded into the card connector **1**, the end surface of the connection object **200** abuts the abutting portions **33** of the plate **30** so that the plate **30** moves along with the connection object **200**. At this time, the engaging portion **42** of the lever **40** moves in the same direction as the plate **30** due to the engagement between the engaging portion **42** of the lever **40** and the engaging portion **32** of the plate **30**. As a result, the lever **40** turns about the rotation shaft **22** of the frame **20**. Thus, the coupling portion **43** of the lever **40** moves in a direction opposite to a loading direction of the connection object **200** relative to the card connector **1**, that is, in an unloading direction of the connection object **200** relative to the card connector **1**.

On the other hand, for unloading the connection object **200** from the card connector **1**, the coupling portion **43** of the lever **40** is pushed in the loading direction by operating the eject mechanism **50**. Then, since the lever **40** turns about the rotation shaft **22**, the engaging portion **42** of the lever **40** causes the plate **30** to move in the unloading direction via the engaging portion **32** of the plate **30**. Thus, the abutting portions **33** of the plate **30** presses the connection object **200** to unload it from the frame **20**.

Referring now to FIGS. **9A** to **14**, the operation of the card connector **1** according to this embodiment will be described in more detail. First, when the connection object **200** is loaded while the button **90** is in the first position (initial position), the state becomes as shown in FIGS. **9A** and **10**. In this state, due to the spring force of the coil spring **100**, the cam engaging portion **112** of the spring **110** is received in the recessed portion **64a** of the heart cam **64** and retained in a position corresponding to the first position of the button **90**. Since the eject bar **80** is pressed to move toward the push-side end **96** of the button **90** due to the rotation of the lever **40**, the eject bar **80** enters between the stopper groove **93** of the button **90** and the stopper **63** so as to prohibit engagement between the button **90** and the stopper **63**.

When the button **90** is pushed in this state, the spring **110** is also pushed along with the button **90** so that a pivotal motion of the spring **110** is caused with respect to the button engaging portion **111** due to the function of the heart cam **64**. Specifically, when the button **90** is pushed, since there exists the first step **64b**, the cam engaging portion **112** in the recessed portion **64a** moves in the first groove **64d** along the first wall **64c**, rides across the first inclined portion **64e** and over the second step **64f** to reach the second wall **64g**, and retained in a position corresponding to the second position of the button **90**. This state is shown in FIG. **9B**.

Subsequently, when the force to push the button **90** is relaxed, the button **90** is pushed back by the force of the coil spring **100**. At this time, the cam engaging portion **112** of the spring **110** moves in the second groove **64h** of the heart cam **64** and reaches the third step **64j** via the second inclined portion **64i**, and retained in a position corresponding to the third position of the button **90**. Thus, the button **90** projects to the greatest degree and retained in the third position. These states are shown in FIGS. **9C** to **9E**.

When the button **90** is pushed again while the button **90** is in the third position, the cam engaging portion **112** of the spring **110** moves in the third groove **64l** and passes the third inclined portion **64m**. While moving in the bent third groove **64l**, the cam engaging portion **112** of the spring **110** deviates in a direction perpendicular to the directions **201** so that the contact plate **120** rotates along with the spring **110**. Due to this rotation, the end portion **122** of the contact plate **120** engages with an end of the tapered portion **82** of the eject bar **80**. Accordingly, when the button **90** is further pushed, the eject bar **80** is also pushed by the contact plate **120**. This state is shown in FIGS. **9F** and **12**.

When the button **90** is further pushed from the state shown in FIGS. **9F** and **12**, the eject bar **80** disengages from the end portion **63c** of the stopper **63** as shown in FIGS. **9G** and **13**. At this time, since the stopper **63** returns to the initial state, the end portion **63c** enters the stopper groove **93** of the button **90** via the button slide groove **62** of the casing **60**.

Further, since the eject bar **80** is pushed in the foregoing loading direction by the movement of the button **90**, the lever **40** turns to move the plate **30** in the foregoing unloading direction so that the connection object **200** is unloaded. When the finger disengages from the button **90** in this state, the cam engaging portion **112** of the spring **110** enters the recessed portion **64a** due to the biasing force of the coil spring **100** so that the button **90** returns to and retained in the first position, as shown in FIGS. **9H** and **14**. A combination of the heart cam **64**, the spring **110**, and the contact plate **120** is referred to as a position control mechanism.

Even if the button **90** is pushed in this state, since the end portion **63c** of the stopper **63** abuts against the stopper

surface **93a** of the stopper groove **93**, the button **90** can not be depressed. Thus, the foregoing eject operation can not be carried out. The stopper **63** will be referred to as an inhibiting mechanism.

On the other hand, when the connection object **200** is loaded again in this state, the plate **30** is pushed to turn the lever **40** so as to move the eject bar **80** in the unloading direction. Then, the tapered portion **82** of the eject bar **80** presses the tapered portion **63b** of the stopper **63** to bring the stopper **63** into the displaced state from the initial state. Thus, the end portion **63c** of the stopper **63** moves out of the stopper groove **93** of the button **90** to realize the state shown in FIG. **10**. In this state, the eject operation can be carried out by pushing the button **90**. In this event, a combination of the plate **30**, the lever **40**, and the eject bar **80** will be referred to as a releasing mechanism.

In the card connector according to this embodiment, even when the connection object **200** is loaded or inserted, the position of the button **90** is not changed. When unloading the connection object **200**, by pushing the button **90** and then disengaging the finger from the button **90**, the button **90** is projected. Then, by pushing again the projected button **90**, the connection object **200** is unloaded. After the unloading, the button **90** returns to the initial position. Further, although the button **90** is projected by pushing the button **90** while the connection object **200** is loaded, the button **90** is not operated and thus not projected even by pushing the button **90** while the connection object **200** is not loaded.

While the present invention has thus far been described in conjunction with a single embodiment thereof, it will readily be possible for those skilled in the art to put this invention into practice in various other manners.

What is claimed is:

1. A card connector for connecting a card-shaped connection object which is loaded into said connector in a first direction, said connector comprising:

- a frame for receiving said connection object;
- a button coupled to said frame and operated to move in said first direction for causing said connection object to be unloaded from said connector; and
- a position control mechanism connected to said frame and said button for controlling a position of said button so that said button is cyclically movable among a first, a second, and a third position, said first position being between said second and said third positions in said first direction.

2. A card connector as claimed in claim 1, further comprising an urging member connected to said button for urging said button towards said third position in a second direction opposite to said first direction.

3. A card connector as claimed in claim 1, further comprising:

- a plate coupled to said frame so as to be movable in said first direction and a second direction opposite to said first direction, said plate being brought into contact with said connection object that is loaded in said connector;
- a lever having a first end portion, a second end portion coupled to said plate, and an intermediate portion between said first and said second end portions and pivotally connected to said frame; and
- an eject bar coupled to said frame so as to be movable in said first and said second directions and connected to said first end portion of the lever, said eject bar being engaged with said button in said first and said second directions so that said eject bar is moved in said first

direction to make said plate eject said connection object from said connector when said button is moved from said third position to said first position and that said eject bar is moved in said second direction to make said button move from said second position towards said third position when said connection object is loaded into said connector.

4. A card connector as claimed in claim 1, further comprising an inhibiting mechanism connected to said frame and said button for inhibiting movement of said button at said first position in said first direction only when said connection object is not loaded in said connector.

5. A card connector as claimed in claim 4, further comprising a releasing mechanism operatively connected to said inhibiting mechanism for releasing operation of said inhibiting mechanism to enable said button move from said first position to said second position when said connection object is loaded in said connector.

6. A card connector as claimed in claim 4, wherein said inhibiting mechanism comprises:

- a plate spring portion connected to said frame and extending in a second direction, opposite to said first direction, said plate spring portion being elastically bendable; and
- an end portion connected to said plate spring portion for engaging with said button to stop said button at said first position in a condition where said eject bar is moved in said first direction.

7. A card connector as claimed in claim 6, further comprising an eject bar coupled to said frame so as to be movable in said first and said second directions, said eject bar being engaged with said button in said first and said second directions so that said eject bar is moved in said first direction to eject said connection object from said connector when said button is moved from said third position towards said first position and that said eject bar is moved in said second direction to move said button from said second position towards said third position when said connection object is loaded into said connector, said inhibiting mechanism further comprising a tapered portion connected to said plate spring portion for engaging with said eject bar to release said end portion from said button with an elastic bend of said plate spring portion when said eject bar is moved in said second direction.

8. A card connector comprising:

- a frame allowing a card-shaped connection object to be loaded therein and unloaded therefrom in given directions;
- a plate provided on said frame so as to be movable in said given directions and arranged to contact with said connection object;
- a lever provided on said frame so as to be turnable and coupled at one end thereof to said plate; and
- an eject mechanism coupled to said lever, said eject mechanism comprising:
 - a button movable along said given directions;
 - an urging member connected to said button for urging said button so that a push-side end of said button projects from a given wall;
 - an eject bar coupled to said frame and the other end of said lever and movable along said given directions; and
 - a movement control mechanism interposed between said button and said eject bar for controlling said button to cyclically move among a first position where said push-side end projects from said given

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wall to a small degree, a second position where said push-side end projects from said given wall to the smallest degree, and a third position where said push-side end projects from said given wall to the greatest degree, said movement control mechanism 5 transmitting the movement of said button to said eject bar when said button moves from said third position to said first position.

9. A card connector as claimed in claim 8, further comprising a stopper mechanism restricting the movement of said button so as to retain said button in said first position 10 when said button is pushed for moving said button from said first position to said second position while said connection object is not loaded in said frame.

10. A card connector as claimed in claim 9, wherein said stopper mechanism comprises: 15

- a stopper formed at a casing;
- said eject bar; and

a stopper groove being formed at said button, said stopper 20 having an end portion which can be projected into or retreated from said stopper groove and is normally projected into said stopper groove, said eject bar moving toward said end portion of the stopper to engage with said end portion of the stopper so as to force said end portion of the stopper out of said stopper groove 25 when said connection object is loaded into said frame, while said eject bar moves in a direction away from said end portion of the stopper to release engagement with said end portion of the stopper when said connection object is unloaded from said frame, said stopper 30 groove receiving said end portion of the stopper projected into said stopper groove so as to be movable in said given directions relative to said stopper groove,

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while said stopper groove has a stopper surface which engages with said end portion of the stopper, when said connection object is not loaded in said frame and said button is in said first position, for prohibiting the movement of said button to said second position.

11. A card connector as claimed in claim 8, wherein said movement control mechanism comprises:

- a spring having one end pivotally attached to said button;
- a contact plate attached to said spring and intermittently abutting said eject bar; and
- a heart cam fixed to said frame and receiving the other end of said spring, said heart cam transferring said other end of the spring in one-way directions and retaining said other end of the spring in positions corresponding to said first and third positions, respectively, said heart cam causing said contact plate to contact with said eject bar when said button moves from said third position to said second position.

12. A card connector as claimed in claim 8, wherein said eject mechanism comprises:

- a casing including a fixing groove for fixation to said frame;
- a button slide groove for receiving said button so as to be movable in said given directions;
- an eject bar slide groove for receiving said eject bar so as to be movable in said given directions; and
- a cover for covering said casing so as to prevent said button from falling off from said button slide groove, said eject mechanism being formed into a unit by means of said casing and said cover.

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